

with a view to identifying techniques for buffering against, or protecting against the hazard. This is not being done, as I recall, in the University of Kentucky.

Mr. NATCHER. Now, Dr. Kotin, what other programs do you have underway in the field we are talking about?

Dr. KOTIN. We are not doing anything yet except evolving the techniques for the other side of the coin. Pesticide residues in tobacco; we are concerned with the tobacco being a crop, as with all other crops, edible or otherwise. Is there a hazard in the residues of pesticides which remain at the time the consumer gets the product?

Mr. NATCHER. Right at that point, Doctor, do you know whether or not this type of research is under way at the University of Kentucky as far as pesticides are concerned?

Have you ever checked, Doctor, to find out just what they are doing down there?

Dr. KOTIN. Yes, sir. I get their quarterly and semiannual reports through the Department of Agriculture. I am aware of the \$1.5 million appropriation they received and have been receiving for several years. The Surgeon General was requested by the Secretary of Agriculture to designate a responsible person to represent the Department of Health, Education, and Welfare, and the Surgeon General. Terry, at that time, designated me. I have been to Lexington. I would say within the last year no less than four scientists from the University of Kentucky program have visited the National Environmental Health Sciences Center. Dr. Burdick and Dr. Stedman, and Dr. Woodward and Dr. Senci from the Department of Agriculture, have been to the National Center all within the last 2 months. In addition, several discussions have been held with Dr. Hoover of the Department of Agriculture.

Mr. NATCHER. You were down there, Doctor. What did you find out about research in regard to pesticides used in tobacco?

Dr. KOTIN. At the University of Kentucky, at that time there was no mention of it in the presentation that was made that I attended.

Mr. NATCHER. The fact that it wasn't mentioned in the presentation made during your presence doesn't mean it is not underway, does it?

Dr. KOTIN. In the agronomy school there is a large amount of activity going on in the field of pesticides.

#### SIGNIFICANCE OF TOBACCO INDUSTRY FOR THE ECONOMY

Mr. NATCHER. You know, Doctor, I serve on the Subcommittee on Agriculture Appropriations and I have for 14 years. The tobacco industry is a \$10 billion industry. In 22 States 700,000 families are involved in raising tobacco. My home State of Kentucky produces more tobacco than any other three States in the United States, with the exception of North Carolina. Beginning in 1958, Dr. Kotin, on the Subcommittee on Agricultural Appropriations, I informed the Department of Agriculture that we needed more research in regard to tobacco. If tobacco is harmful to the health of the people in this country, we want to know about it.

Finally I got the Department of Agriculture and the House of Representatives to go along on an increase of about \$250,000. We

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raised that amount up to \$1,500,000 which, as you know, is simply a drop in the bucket. When you consider all this money that you have in grants, in the Department of Health, Education, and Welfare—billions of dollars—\$1,500,000 is just a drop in the bucket. Do you agree to that, Doctor?

Dr. KOTIN. It is certainly a comparatively small amount.

Mr. NATCHER. When Dr. Terry appeared before the Committee on Agriculture after releasing the report on smoking and health, he was asked the question: Is there need at this time for additional research in tobacco? You can go back and check the hearings. He said "Absolutely."

"We need more research now."

That was within a matter of 2 weeks after the report was released.

Now, Dr. Kotin, in the State of my colleague, Mr. Hull here of Missouri, and in my home State of Kentucky, all we are asking you and your associates to do is not to destroy a \$10 billion industry until we have a chance to do something about it.

This is an important matter to a lot of people. We started long before you did, Doctor, and we started in a small way, and we are sincere, and we are honest in our efforts. We don't intend for you or anybody else to destroy the tobacco program. That is the reason that I am asking you these questions.

We have made a sincere effort and we are going to continue our efforts. My people today, Doctor, in the State of Kentucky believe that if tobacco is harmful to the health of our people, we must do something about it. But we want to stop all this guessing, Doctor. That is all we ask. Let's just stop the guessing.

That is the reason I am propounding these questions to you, Doctor, and I am going to propound them to you as long as I serve on this committee. I say that to you frankly.

Now, all we are trying to do is to make a good, honest effort to find out what the trouble is and, if it is caused by tobacco, we want to do something about it. That applies to you, Doctor, and it applies to all of your associates. That is our feeling about this matter, Doctor.

Dr. KOTIN. I don't think we are far apart. When the Scientific Advisory Board to the tobacco industry was established, I was invited as a charter member and served for 10 years on the committee. I obviously felt that it was a situation that merited scientific attention and I assumed I was invited because of interest in the problem. However, had I felt the situation was all locked up and all the facts were known, I never would have accepted membership on the committee. I serve on the American Medical Association Committee on Smoking and Health, on their advisory committee as further evidence of my conviction that additional information is necessary. I know the concept of a less hazardous cigarette is something that I have contributed to, in part, in its evolution, and in terms of conviction because, again, life is too short to spin wheels on things which there is little feasibility of achieving.

I don't think we are nearly as far apart as would appear.

Mr. Natcher.

I agree with my chairman that you have great ability and I hope that we understand each other a little better.

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## COORDINATION OF RESEARCH ON TOBACCO AND HEALTH

Mr. HULL. Would you tell us how these programs are coordinated?

Dr. KOTIN. These programs are coordinated by formal exchanges of information including reprint exchange and conferences, by informal joint meetings and contacts, personal associations and access to central repositories of scientific information. The AMA Committee for Research on Tobacco and Health and the Council for Tobacco and Research exchange listings of research projects by title and investigator. Research supported by the PHS as well as by other recognized granting agencies including various foundations and other components of Government are listed in the Scientific Information Exchange. The title of the investigation, the name of the investigator, and brief abstracts of the proposed research are available from S.I.E. In addition, joint membership by scientists on several committees provides important communication. For example, one scientist is a member of the AMA committee, a member of the Scientific Advisory Board of the Council for Tobacco Research (U.S.A.), and in addition serves on one of the advisory groups to the U.S. Public Health Service.

In the past, I have served on the Scientific Advisory Board of the Tobacco Research Council; I am at present on the AMA Committee on Smoking and Health and share responsibility for the NIH program in tobacco and health. In addition, my associates and I are advisers to the Department of Agriculture in relation to research support at the University of Kentucky. The lung cancer task force membership includes representatives from the Department of Agriculture, private research organizations, and the tobacco industry. Thus, coordination of these activities is carried out through formal administrative structures as well as through the exchange of information resulting from publication of research findings in the scientific literature.

Mr. HULL. Don't you believe more could be done by the Government to cooperate with the tobacco industry in the area of smoking and health?

Dr. KOTIN. This is almost a policy matter, and I am perhaps the wrong one to ask because from the days of my tobacco industry research committee membership my relationships with the industry have been so cordial that it has to be brought to my attention that there really isn't this cordiality up and down the line.

Mr. HULL. My final question is, what do you suggest to improve on the present situation?

Dr. KOTIN. In relation to industry?

Mr. HULL. Yes, and you can put that in the record if you like.

Dr. KOTIN. One, I think industry representatives are, from a technological point of view—policywise—indispensable to the development of the scientific program within the Federal Government, and I think Dr. Endicott has emphasized his successful efforts to get industry representatives to deliberate and participate in programs. The Division certainly does this in terms of the body of information the industry has. It is, first, not only deeper than available from other sources, but it can provide an effective base from which we can build so there will be as little duplication as one can achieve.

Mr. HULL. Thank you, Doctor.

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## SMOKING AND CORONARY HEART DISEASE

Mr. HULL. With regard to cardiovascular disease, discussed on pages 9 and 10 of the pamphlet, you have selected portions of the 1964 Surgeon General's report and then said, "By 1967, additional evidence pointed even more strongly toward cigarette smoking as a cause of death from coronary heart disease." Isn't it a fact that in 1964, the Advisory Committee did not find that cigarette smoking was the cause of coronary heart disease? Isn't it also a fact that there is considerable disagreement in this area?

Dr. STEWART. That is right.

We have never said it was a cause. I do not think there is any disagreement.

Mr. HULL. Doctor, let me read you the opening three paragraphs from a Harvard University Press release in an article which appeared recently:

A scientist in the department of nutrition of the Harvard School of Public Health challenges the statements of the U.S. Public Health Service, the American Heart Association and others who claim cigarette smoking is causally linked to increased deaths from coronary heart disease.

Dr. Carl C. Seltzer, research association in physical anthropology, in an article in the current issue of the Journal of the American Medical Association, revealed that he based his disagreements on a review of the "epidemiological evidence" in the recent medical literature concerned with relationships between coronary heart disease and cigarette smoking.

It is \* \* \* difficult to see from the new epidemiological data how valid causal inferences can be drawn that cigarette smoking is linked to excess coronary heart disease deaths or that excess coronary heart disease deaths are "caused by" cigarette smoking. We do not know whether or not there is a causal connection between cigarette smoking and increased deaths from coronary heart disease.

Wasn't Dr. Seltzer a contributor to the 1964 Smoking and Health Report to the Surgeon General?

Dr. STEWART. Yes, he was. I would like to point out, however, that he was inaccurate in his statement in the JAMA article. We have never said there was a causal relationship.

Mr. HULL. Hasn't he also written that there are significant differences between smokers and nonsmokers such as body build, that are not the result of smoking?

Dr. STEWART. Certainly.

Mr. HULL. Have you read the article?

Dr. STEWART. Yes.

Mr. HULL. Do you agree or disagree with Dr. Seltzer?

Dr. STEWART. On the fact that we cannot establish cause and effect between cigarette smoking and coronary disease, I think we agree.

## FUNDING FOR ALL SMOKING AND HEALTH PROJECTS

Mr. HULL. Now, Dr. Stewart, I would like for you to furnish this subcommittee for the record complete information on all smoking and health projects being supported in any way by this Government, including a description of the project and the period of time covered and the cost and the division or institute having control.

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mand that we get a dollar's value for each dollar spent by Federal agencies. Following along with this thought, last year I asked you if any constituent had been identified in cigarette smoke since the Surgeon General's report of 1964, that had been found to be responsible for any human disease and you said you didn't know. My question is: Now that you have spent another \$7 million in the field of biomedical research, can you illuminate us as to any constituent which can be identified as being responsible for any human disease?

Dr. STEWART. Mr. Hull, at the present time, what we are doing is trying to identify all the constituents in cigarette smoke and in the gaseous phase which are carcinogenic. We have a long list of those which are potential causes of carcinoma in human beings, and which are cytotoxic and produce changes in cells and in animals which are compatible with being carcinogenic. We have not identified the item in cigarette smoke or in the gaseous phase. I would like also to point out that we are beginning to think that there may be some potentiation of items in the cigarette smoke and items in the environment which lead to it rather than being a single item. It may be a multiplicity of items. I think we will spend a lot more money before we have identified the specific elements of cigarette smoke or the gaseous part of the cigarette smoke as the etiological substance which causes lung cancer in human beings.

Mr. HULL. That leads me on to this question. Last year I inquired if there were any specific agents in cigarette smoke which could be pointed to as the cause of lung cancer and you said there was not. Presumably you have spent a great deal of money over the past year in pursuit of this elusive—if existent—agent and I ask you, Can you report that you have finally located such an agent?

Dr. STEWART. No; but I think that the question is not quite what the answer was. I think we have many agents in cigarette smoke which are highly probable as being the etiological agents of lung cancer. But I cannot say this specific item is it.

#### NICOTINE

Mr. HULL. The 1964 Surgeon General's report on smoking stated, at page 32, that nicotine was not an important health hazard and, at page 75, stated that nicotine probably does not represent a significant health problem. Last year when you were asked about this to determine whether there had been any change in scientific thought about nicotine, you indicated that there was a review being conducted by the PHS of the current research and that the review would be issued when it was completed. Has the review been completed and can you now tell us if you can give us some concrete information along this line?

Dr. STEWART. Yes. The review is the report that was sent to the Congress as required by law last year, which brings up to date the scientific evidence that has developed since the 1964 review. There is one interesting study reported in there which lends one to have some concern about nicotine. It has not been confirmed to my knowledge in the scientific literature at the present time but it is an interesting lead. There is one study that reports that the nicotine increases the oxygen demand of heart muscle. This is a very interesting

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finding, if this is so, because it could possibly link nicotine to cardiovascular diseases. Again, I say this is just an addition. We also know that some of the properties that cause physiological dependence on cigarettes are in the nicotine area. There has also been some research done on the enzymes which handle the nicotine in the body, and the ability to characterize smokers and nonsmokers as having different enzymes. There has been some progress made on nicotine since the 1964 report. I think the conclusion of the 1964 report was correct with the evidence that was available. But I think we need to pursue it a lot further in the scientific realm before we could draw any other conclusion than what was in the 1964 report.

Mr. HULL. In other words, we will spend probably several million in an effort to establish nicotine as a health hazard notwithstanding the 1964 report?

Dr. STEWART. I think what we are doing is we are spending several millions to find what it is that makes cigarettes hazardous to health. In exploring this we will be looking at the hydrocarbons, the gases, the tars, and the nicotine. We are looking at all avenues. It seems to me with the 55,000 lung cancer deaths and a rising rate of lung cancer deaths—

Mr. HULL. Do you attribute that to smoking?

Dr. STEWART. I think we attribute very much of it to smoking cigarettes.

Mr. HULL. How much?

Dr. STEWART. One cannot say, but it looks, as if, from the data we have, it is the major contributing factor to the cause of lung cancer.

The conclusion of the 1964 report was that it was a cause-and-effect relationship between cigarette smoking and lung cancer.

#### SURVEYS ON SMOKING

Mr. HULL. Dr. Stewart, last year we had information to the effect that the National Clearinghouse had awarded contracts totaling over half a million dollars sending people around to try to determine what people think about smoking. Similar surveys have been conducted since last year's hearings. Assuming that such questions can be a productive or useful field of inquiry, which I do not, can you now tell us if the PHS has discovered how people feel about smoking?

Dr. STEWART. Yes, we have had some additional information about how people feel about smoking, what was the reason for the rise in filter cigarettes. Also, much more important, and we have concentrated much more on this as to why people smoke cigarettes. We have found that there are a variety of types of smokers: some who are addicted, some who are psychologically dependent, some who are in a social environment where this is a social part of the picture, some who are physiologically dependent. We did not know this before. We thought all cigarette smokers were more or less alike. The later information has broad implications on trying to develop programs to help cigarette smokers become nonsmokers.

Mr. HULL. Dr. Stewart, you have been spending all this money trying to find out what people think about smoking and what makes them smoke or not smoke and you have been spending a great deal of money trying to get the American people to see things your way.

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